

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

REC'D 01 JUL 2003

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| Applicant's or agent's file reference 5869-13 | FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416) | |
| International application No. PCT/US01/22121 | International filing date (day/month/year) 13 July 2001 (13.07.2001) | Priority date (day/month/year) 13 July 2000 (13.07.2000) |
| International Patent Classification (IPC) or national classification and IPC IPC(7): H03B 29/00; A61F 11/06; G10K 11/16 and US Cl.: 381/71.6 | | |
| Applicant MATECH, INC. | | |
| <p>1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of <u>9</u> sheets, including this cover sheet.</p> <p><input type="checkbox"/> This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).</p> <p>These annexes consist of a total of <u> </u> sheets.</p> <p>3. This report contains indications relating to the following items:</p> <p>I <input checked="" type="checkbox"/> Basis of the report</p> <p>II <input type="checkbox"/> Priority</p> <p>III <input type="checkbox"/> Non-establishment of report with regard to novelty, inventive step and industrial applicability</p> <p>IV <input type="checkbox"/> Lack of unity of invention</p> <p>V <input checked="" type="checkbox"/> Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</p> <p>VI <input type="checkbox"/> Certain documents cited</p> <p>VII <input checked="" type="checkbox"/> Certain defects in the international application</p> <p>VIII <input type="checkbox"/> Certain observations on the international application</p> | | |
| Date of submission of the demand 10 January 2002 (10.01.2002) | Date of completion of this report 06 June 2003 (06.06.2003) | |
| Name and mailing address of the IPEA/US Mail Stop PCT, Attn: IPEA/US Commissioner for Patents P.O. Box 1450 Alexandria, Virginia 22313-1450 Facsimile No. (703)305-3230 | Authorized officer Con P. Tran Telephone No. (703) 306-0377 | |

Form PCT/IPEA/409 (cover sheet) (July 1998)

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/US01/22121

I. Basis of the report

1. With regard to the elements of the international application:*

- ☒ the international application as originally filed.
- ☒ the description:
pages 1-35 _____ as originally filed
pages NONE _____, filed with the demand
pages NONE _____, filed with the letter of _____.
- ☒ the claims:
pages 36-41 _____, as originally filed
pages NONE _____, as amended (together with any statement) under Article 19
pages NONE _____, filed with the demand
pages NONE _____, filed with the letter of _____.
- ☒ the drawings:
pages 1-23 _____, as originally filed
pages NONE _____, filed with the demand
pages NONE _____, filed with the letter of _____.
- ☐ the sequence listing part of the description:
pages NONE _____, as originally filed
pages NONE _____, filed with the demand
pages NONE _____, filed with the letter of _____.

2. With regard to the language, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language _____ which is:

- ☐ the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of the translation furnished for the purposes of international preliminary examination (under Rules 55.2 and/or 55.3).

3. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in printed form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. ☐ The amendments have resulted in the cancellation of:

- ☐ the description, pages NONE
- ☐ the claims, Nos. NONE
- ☐ the drawings, sheets/fig NONE

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).**

* Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17).

** Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.

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V. Reasoned statement under Rule 66.2(a)(II) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. STATEMENT

| | | |
|-------------------------------|-------------------------|-----|
| Novelty (N) | Claims 3-5, 7-15, 17-30 | YES |
| | Claims 1-2, 6, 16 | NO |
| Inventive Step (IS) | Claims NONE | YES |
| | Claims 1-30 | NO |
| Industrial Applicability (IA) | Claims 1-30 | YES |
| | Claims NONE | NO |

2. CITATIONS AND EXPLANATIONS

Please See Continuation Sheet

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VII. Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

The description is objected to as containing the following defect(s) under PCT Rule 66.2(a)(iii) in the form or contents thereof:

Page 2, line 11 has a spelling error "operators mouth".

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Supplemental Box

(To be used when the space in any of the preceding boxes is not sufficient)

1. Claims 1-2, and 16 lack novelty under PCT Article 33(2) as being anticipated by Guan et al. (U.S. 5,099,519).

Regarding claim 1-2, and 16, Guan teaches (see Fig. 1, 2 and respective portions of the specification) a full duplex audio headset (12) comprising:

a first ear piece (28) having a speaker (32; col. 2, lines 64-66) that connected to receiver (40);
a second ear piece (26) having a microphone (30; col. 2, lines 50-63) that connected to transmitter (38); the earpieces are positioned next to ears of an operator, an acoustical isolator (27) positioned within the first ear piece (26) for isolating the microphone from audio signals attributed to bone conduction, headband (20) extending downward from earpieces.

2. Claims 1-2, and 6 lack novelty under PCT Article 33(2) as being anticipated by Morrill et al. (WO 98/45937).

Regarding claim 1-2, and 6, Morrill et al. teaches (see Fig. 1, 2 and respective portions of the specification) a full duplex audio headset (12) comprising:

a first ear piece (12L) having a speaker (24L) that connected to receiver (16), the earpiece having housing adapted to inserted within external ear canal; a second ear piece (12R) having a microphone (24R) that connected to transmitter (16), an acoustical isolator (medical grade silicone) positioned within the ear piece (12L) for isolating the microphones from audio signals attributed to bone conduction (page 2, line 28 - page 3, line 19).

3. Claims 3-5 lack an inventive step under PCT Article 33(3) as being obvious over Morrill et al. (WO 98/45937) in view of Lazarus et al. (U.S. 4,280,018).

Regarding to claim 3, Morrill et al. teaches an audio headset according to claim 1. However, Morrill et al. do not explicitly suggest the microphone is a piezoelectric transducer.

In another analogous art, Lazarus et al. teaches (see Fig. 1 and respective portions of the specification) the piezoelectric transducers (10) have been used to produce electrical transmit signals (see col. 1, lines 5-15) from the audio input signals (see line 1, Abstract) because it is small and light (see col. 1, lines 50-52).

Therefore, it would have been obvious to one of ordinary skill in the art, at the time the invention was made to have included within the Morrill reference a microphone that includes a piezoelectric transducer as taught by Lazarus in order to generate the electrical transmit signals from the audio input signals because the piezoelectric transducer is small and light as suggested by Lazarus in column 1, lines 50-52.

Regarding to claims 4-5, Lazarus et al. further teaches (see Fig. 1 and respective portions of the specification) the transducer (10) including a FET transistor (Q1) in order to provide impedance matching. The transistor (Q1) having a first gating terminal coupled to a first terminal (18) of the transducer (12), a second output terminal (D) for outputting the transmitted signal, and

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(To be used when the space in any of the preceding boxes is not sufficient)

a third terminal (5) for coupling to a ground connection, an RC filter coupled across the second and third terminal of the transistor for filtering out low audio frequencies from the electrical transmit signal (col. 2, lines 28-52).

4. Claims 7-8 lack an inventive step under PCT Article 33(3) as being obvious over Morrill et al. (WO 98/45937) in view of White (US 5,907,538).

Regarding to claim 7, Morrill et al. teaches an audio device according to claim 1. However, Morrill et al. do not explicitly suggest the audio device including a full duplex mode circuit for operating the transducer as both a microphone and a speaker.

In the same field of endeavor, White teaches (see Fig. 6) the audio device including a full duplex mode circuit for operating the transducer as both a microphone and a speaker (col. 11, lines 52-62).

Therefore, it would have been obvious to one of ordinary skill in the art, at the time the invention was made to have included within the Morrill reference an audio device including a full duplex mode circuit for operating the transducer as both a microphone and a speaker as taught by White in order to transmit signal with minimize feedback as suggested by White in column 2, lines 50-51.

Regarding to claim 8, Morrill et al. teaches the full duplex mode circuit includes:

a first amplifier (104) having a first input coupled to a first terminal of the transducer, a second input coupled to a receive signal input, and an output coupled to both a transmit signal output and a second terminal of the transducer; and

a second amplifier (106) having a first input coupled to ground, a second input coupled to the receive signal input and an output coupled to the transmit signal output (Fig. 4; column 7, lines 16-30).

5. Claim 9 lacks an inventive step under PCT Article 33(3) as being obvious over Morrill et al. (WO 98/45937) in view of White (US 5,907,538) further in view of Lobb (US 4,837,829).

Regarding to claim 9, Morrill et al. in view of White teaches an audio device according to claim 7. However, Morrill et al. in view of White do not explicitly suggest a receive signal phase canceller coupled between the output of the second amplifier and the transmit signal output; and a transmit signal phase canceller coupled between the transmit signal output and the receive signal input.

In the same field of endeavor, Lobb teaches (see Fig. 1) an acoustic sound system in accordance with the invention includes a microphone 12 connected to a phase shifter 14. A second microphone 16 connects to a second phase shifter 18 and the two phase shifters are connected to a summing circuit 20 (col. 2, lines 32-37).

Therefore, it would have been obvious to one of ordinary skill in the art, at the time the invention was made to have included within the Morrill et al. in view of White reference a receive signal phase canceller and a transmit signal phase canceller as taught by Lobb in order to provide a two-way conversations without the need for switching device as suggested by Lobb in column 1, lines 35-36.

6. Claims 10, 11, 12 lack an inventive step under PCT Article 33(3) as being obvious over Morrill et al. (WO 98/45937) in view of Ford (US 5,118,309).

Regarding to claim 10, Morrill et al. teaches an audio device according to claim 1. However, Morrill et al. do not explicitly suggest: a transmit and receive circuit; a first earpiece having a transducer with a positive terminal coupled to the transmit and receive circuit; and a second earpiece having a transducer with a negative terminal coupled to the transmit and receive circuit.

In the same field of endeavor, Ford teaches (see Fig. 3, 5) a transmit and receive circuit; a first earpiece having a transducer with a positive terminal coupled to the transmit and receive circuit; and a second earpiece having a transducer with a negative terminal coupled to the transmit and receive circuit (col. 3, lines 8-37).

Therefore, it would have been obvious to one of ordinary skill in the art, at the time the invention was made to have included within the Morrill reference a circuit as taught by Ford in order to achieve minimum paths as suggested by Ford in column 1, lines 54-55.

Regarding to claims 11 and 12, Ford further teaches a receive signal level control circuit coupled to the transmit and receive circuit (col. 2, lines 27-31); a first amplifier having a first input coupled to the positive terminal of the transducer in the first earpiece and an output coupled to a transmit signal output; and a second amplifier having a first input coupled to the negative terminal of the transducer in the second earpiece and an output coupled to the transmit signal output (Figure 5; col. 2, lines 44-54).

7. Claim 13 lacks an inventive step under PCT Article 33(3) as being obvious over Morrill et al. (WO 98/45937) in view of Ford (US 5,118,309) and further in view of White (US 5,907,538).

Regarding to claim 13, Morrill et al. in view of Ford teaches an audio device according to claim 12. However, Morrill et al. do not explicitly disclose a third amplifier coupled between the outputs of the first and second amplifier and the transmit signal output. In the same field of endeavor, White teaches a third amplifier (116) coupled between the outputs of the first (104) and second (106) amplifier and the transmit signal output (Fig. 4; col. 7, lines 24-30).

Therefore, it would have been obvious to one of ordinary skill in the art, at the time the invention was made to have included within the Morrill, Ford combination a third amplifier as taught by White in order to generate the transmit signal with minimal feedback as

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(To be used when the space in any of the preceding boxes is not sufficient)

suggested by White in column 2, lines 50-51.

8. Claim 14 lacks an inventive step under PCT Article 33(3) as being obvious over Morrill et al. (WO 98/45937) in view of Dowling (US 4,644,330).

Regarding to claim 14, Morrill et al. teaches an audio device according to claim 1. However, Morrill et al. do not explicitly disclose a switching circuit coupled between the transducer and the transmit circuit for switching the transducer between operation as a microphone and a speaker.

In the same field of endeavor, Dowling teaches (see Fig. 1) a switching circuit coupled between the transducer and the transmit circuit for switching the transducer between operation as a microphone and a speaker (col. 3, lines 36-46). Therefore, it would have been obvious to one of ordinary skill in the art, at the time the invention was made to have included within the Morrill reference a circuit as taught by Dowling in order to reduce the size of the device and its cost, and makes the device more comfortable to wear as suggested by Dowling in column 2, lines 57-59.

9. Claim 15 lacks an inventive step under PCT Article 33(3) as being obvious over Morrill et al. (WO 98/45937) in view of Bandara et al. (US 4,644,330).

Regarding to claim 15, Morrill et al. teaches an audio device according to claim 1. However, Morrill et al. do not explicitly disclose a voice recognition system coupled to the transmit circuit for converting audio signals detected by the transducer from the ear canal into digital text.

In another analogous art, Bandara et al. teaches (see Fig. 1) a voice recognition system coupled to the transmit circuit for converting audio signals detected by the transducer from the ear canal into digital text. (col. 4, lines 46-64). Therefore, it would have been obvious to one of ordinary skill in the art, at the time the invention was made to have included within the Morrill reference a voice recognition system as taught by Bandara et al. in order to open the possibility to make speech recognition available in low-cost personal computers (PC's), even in portable computers like laptops as suggested by Bandara et al. in column 2, lines 57-59.

10. Claim 16 lacks an inventive step under PCT Article 33(3) as being obvious over Morrill et al. (WO 98/45937) in view of Leight (US 6,138,790).

Regarding to claim 16, Morrill et al. teaches an audio device according to claim 1. However, Morrill et al. do not explicitly disclose earpieces for positioning in or next to ears of an operator; and a band extending downwards from the two earpieces. In the same field of endeavor, Leight teaches (see Fig. 1) earpieces for positioning in or next to ears of an operator; and a band extending downwards from the two earpieces (Figure 3; column 3, lines 12-41).

Therefore, it would have been obvious to one of ordinary skill in the art, at the time the invention was made to have included within the Morrill reference a band as taught by Leight in order to provide attachment of the earpieces to operator's head.

11. Claims 17, 18, 21, and 24-25 lack an inventive step under PCT Article 33(3) as being obvious over Morrill et al. (WO 98/45937) in view of Leight (US 6,138,790), and further in view of Mäkelä (WO 97/27721).

Regarding to claims 17 and 18, Morrill et al. in view of Leight teaches an audio device according to claim 16. Morrill et al. in view of Leight does not disclose opposite ends of the band extend forward from the earpieces and then a middle section of the band extends downwardly in a U shaped from the opposite ends and an audio device wherein the opposite ends of the band to curve forward to extend in front of earlobes on the operator.

In the same field of endeavor, Mäkelä teaches opposite ends of the band extend forward from the earpieces and then a middle section of the band extends downwardly in a U shaped from the opposite ends and an audio device wherein the opposite ends of the band to curve forward to extend in front of earlobes on the operator (Figure 6; page 9, lines 3-7). It would be obvious to one of ordinary skill in the art at the time the invention was made to have modified Morrill in view of Leight with a band wherein opposite ends of the band extend forward from the earpieces and then a middle section of the band extends downwardly in a U shaped from the opposite ends and an audio device wherein the opposite ends of the band to curve forward to extend in front of earlobes on the operator as taught by Mäkelä in order to provide an easier use of glasses at the same time with the headset (page 3, lines 16-17).

Regarding claim 21, Morrill et al. teaches (see Fig. 1) a first ear piece (12L) having a transducer (24L) that operates as a speaker; a second ear piece (12R) having a transducer (24R) that operates as a microphone (page 2, lines 2-17). Morrill et al. does not disclose a band having bends, twisting at each end portion. Leight teaches a band having bends, twisting at each end portion (Figure 3; column 3, lines 16-49). It would be obvious to one of ordinary skill in the art at the time the invention was made to have modified the Morrill reference with a band having a bends, twisting at each end portion as taught by Leight in order to provide attachment of the earpieces to operator's head. Morrill et al. in view of Leight does not disclose opposite ends of band that extend forward from the two earpieces and a middle portion that extends downward from the opposite ends. Mäkelä teaches opposite ends of band that extend forward from the two earpieces and a middle portion that extends downward from the opposite ends (Figure 6; page 9, lines 3-7).

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page 9, lines 3-7). It would be obvious to one of ordinary skill in the art at the time the invention was made to have modified Morrill in view of Leight with a band that extend forward from the two earpieces and a middle portion that extends downward from the opposite ends as taught by Makkonen in order to provide an easier use of glasses at the same time with the headset as suggested by Makkonen in page 3, lines 16-17.

Regarding claim 24, Makkonen further teaches a headset according to claim 21, wherein opposite ends of the band curve forward to extend in front of earlobes of an operator (Figure 6, page 9, lines 3-7).

Regarding claim 25, Morrill et al. teaches (see Fig. 1) a headset including an acoustical isolator (medical grade silicone) positioned within the first and second earpiece for substantially isolating the transducers from audio signals attributed to bone conduction (page 2, line 28 - page 3, line 19).

12. Claims 26 and 27 lack an inventive step under PCT Article 33(3) as being obvious over Morrill et al. (WO 98/45937) in view of Leight (US 6,138,790), in view of Makkonen (WO 97/27721), and further in view of Lazarus et al. (U.S. 4,280,018).

Regarding claim 26, Morrill et al., Leight, Makkonen in combination teach a headset according to claim 21. However, Morrill et al., Leight, Makkonen in combination does not teach the headset including a transistor in at least the first earpiece having a first gating terminal coupled to a first terminal of the transducer, a second output terminal for outputting a transmit signal, and a third terminal for coupling to a ground connection. In another analogous art, Lazarus et al. further teaches (see Fig. 1 and respective portions of the specification) the transducer (10) including a FET transistor (Q1) in order to provide impedance matching. The transistor (Q1) having a first gating terminal coupled to a first terminal (18) of the transducer (12), a second output terminal (D) for outputting the transmitted signal, and a third terminal (S) for coupling to a ground connection (col. 2, lines 28-52). It would have been obvious to one of ordinary skill in the art, at the time the invention was made to have included within the Morrill et al., Leight, Makkonen in combination a transistor as taught by Lazarus et al. in order to provide impedance matching as suggested by Lazarus et al. in column 1, lines 33-36.

Regarding claim 27, Lazarus et al. further teaches an RC filter coupled across the second and third terminal of the transistor for filtering out low audio frequencies from the transmit signal (col. 2, lines 28-52).

13. Claim 28 lacks an inventive step under PCT Article 33(3) as being obvious over Morrill et al. (WO 98/45937) in view of Leight (US 6,138,790), in view of Makkonen (WO 97/27721), and further in view of White (US 5,907,538).

Regarding claim 28, Morrill et al., Leight, Makkonen in combination teaches a headset according to claim 21. However, Morrill et al., Leight, Makkonen in combination does not explicitly suggest the audio device including a full duplex mode circuit for operating the transducer as both a microphone and a speaker.

In the same field of endeavor, White teaches (see Fig. 6) the audio device including a full duplex mode circuit for operating the transducer as both a microphone and a speaker (col. 11, lines 52-62). Therefore, it would have been obvious to one of ordinary skill in the art, at the time the invention was made to have included within the Morrill et al., Leight, Makkonen in combination an audio device including a full duplex mode circuit for operating the transducer as both a microphone and a speaker as taught by White in order to transmit signal with minimize feedback as suggested by White in column 2, lines 50-51.

14. Claims 29-30 lack an inventive step under PCT Article 33(3) as being obvious over Morrill et al. (WO 98/45937) in view of Leight (US 6,138,790), in view of Makkonen (WO 97/27721), and further in view of Ford (US 5,118,309).

Regarding claim 29, Morrill et al., Leight, Makkonen in combination teaches a headset according to claim 21. However, Morrill et al., Leight, Makkonen in combination does not explicitly disclose: a transmit and receive circuit; a positive terminal of the transducer in the first earpiece coupled to the transmit and receive circuit; and a negative terminal of the transducer in the second earpiece coupled to the transmit and receive circuit.

In the same field of endeavor, Ford teaches (see Fig. 3, 5) a transmit and receive circuit; a positive terminal of the transducer in the first earpiece coupled to the transmit and receive circuit; and a negative terminal of the transducer in the second earpiece coupled to the transmit and receive circuit (col. 3, lines 8-37). Therefore, it would have been obvious to one of ordinary skill in the art, at the time the invention was made to have included within the Morrill et al., Leight, Makkonen in combination a circuit as taught by Ford in order to achieve minimum paths as suggested by Ford in column 1, lines 54-55.

Regarding claim 30, Ford further teaches a first amplifier having a first input coupled to the positive terminal of the transducer in the first earpiece and an output coupled to a transmit signal output; and a second amplifier having a first input coupled to

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(To be used when the space in any of the preceding boxes is not sufficient)

the negative terminal of the transducer in the second earpiece and an output coupled to the transmit signal output (Figure 5; col. 2, lines 44-54).

15. Claims 19 and 20 lack an inventive step under PCT Article 33(3) as being obvious over Morrill et al. (WO 98/45937) in view of Leight (US 6,138,790), in view of Makkonen (WO 97/27721), and further in view of Yokoyama et al. (US 4,668,842).

Regarding to claims 19 and 20, Morrill et al., Leight, Makkonen in combination does not teach a particular headset wherein the earpieces comprise cups that extend perpendicularly inward from a longitudinal axis of the band, the cups each have a front face that extends along a vertical axis and opposite ends of the band extend along a longitudinal axis at an angle between 5 degrees and 45 from the vertical axis of the front face of the cups. In the same field of endeavor, Yokoyama et al. teaches headset wherein the earpieces comprise cups that extend perpendicularly inward from a longitudinal axis of the band, the cups each have a front face that extends along a vertical axis and opposite ends of the band extend along a longitudinal axis at an angle between 5 degrees and 45 from the vertical axis of the front face of the cups (Fig. 4,5,6; col. 2, line 68 - col. 3, line 11). It would be obvious to one of ordinary skill in the art at the time the invention was made to have modified the Morrill et al., Leight, Makkonen combination with a particular headset as taught by Yokoyama et al. in order to provide a headphone which can satisfactorily be used regardless of the size of the auricle of a human ear as suggested by Yokoyama et al. in column 2, lines 6-8.

16. Claim 22 lacks an inventive step under PCT Article 33(3) as being obvious over Morrill et al. (WO 98/45937) in view of Leight (US 6,138,790), in view of Makkonen (WO 97/27721) and further in view of Yoshimi (U.S. 4,403,120).

Regarding to claim 22, Morrill et al., Leight, Makkonen in combination does not teach a headset including cups extending from the two earpieces that insert into the ear canals of a user, the cups each having a flat front face and a curved backside. In the same field of endeavor, Yoshimi teaches headset including cups extending from the two earpieces that insert into the ear canals of a user, the cups each having a flat front face and a curved backside (Fig. 11; col. 5, lines 44-48). It would be obvious to one of ordinary skill in the art at the time the invention was made to have modified the Morrill et al., Leight, Makkonen combination with a particular headset as taught by Yoshimi in order to provide an earphone with compactness and high performance as suggested by Yoshimi in column 2, lines 24-25.

17. Claim 23 lacks an inventive step under PCT Article 33(3) as being obvious over Morrill et al. (WO 98/45937) in view of Leight (US 6,138,790), in view of Makkonen (WO 97/27721), in view of Yoshimi (U.S. 4,403,120), and further Yokoyama et al. (US 4,668,842).

Regarding to claim 23, Morrill et al., Leight, Makkonen, Yoshimi in combination does not teach a headset wherein the front faces of the cups sit in a substantially vertical axis inside the ear canals and the opposite ends of the band extend from the earpieces in a forward and downwardly sloping angle from the vertical axis. In the same field of endeavor, Yokoyama et al. teaches headset wherein the front faces of the cups sit in a substantially vertical axis inside the ear canals and the opposite ends of the band extend from the earpieces in a forward and downwardly sloping angle from the vertical axis (Fig. 4,5,6; col. 2, line 68 - col. 3, line 11). It would be obvious to one of ordinary skill in the art at the time the invention was made to have modified the Morrill et al., Leight, Makkonen, Yoshimi combination with a particular headset as taught by Yokoyama et al. in order to provide a headphone which can satisfactorily be used regardless of the size of the auricle of a human ear as suggested by Yokoyama et al. in column 2, lines 6-8.

NEW CITATIONS

- US 5,907,538 A (WHITE) 25 May 1999, see column 7, lines 24-30; column 11, lines 52-62.
 US 5,899,973 A (BANDARA et al) 04 May 1999, see column 4, lines 46-64.
 US 5,824,966 A (LEIGHT) 20 October 1998, see column 3, lines 12-41.
 US 5,118,309 A (FORD) 02 June 1992, see column 2, lines 44-54; column 3, lines 8-37.
 US 4,837,829 A (LOBB) 06 June 1989, see column 2, lines 32-37.
 US 4,668,842 A (YOKOYAMA et al) 26 May 1987, see column 2, line 68 - column 3, line 11.
 US 4,644,330 A (DOWLING) 17 February 1987, see column 3, lines 36-46.
 US 4,403,120 A (YOSHIMI) 06 September 1983, see column 5, lines 44-48.
 US 4,280,018 A (LAZARUS et al) 21 July 1981, see column 1, lines 5-15; column 2, lines 28-52.
 WO 97/27721 A (MAKKONEN) 31 July 1997, see column 9, lines 3-7.